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Abstract Title: Atmospheric Studies with the Terra Multi-angle Imaging SpectroRadiometer: First Results

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The Multi-angle Imaging SpectroRadiometer (MISR) instrument was launched aboard the Terra spacecraft on December 18, 1999. After an initial checkout phase, the instrument cover was opened on February 24, 2000 and collection of Earth imagery began. MISR contains nine cameras pointed at fixed along-track directions, and acquires images with view angles at the Earth's surface ranging from 70.5 degrees forward of nadir to 70.5 degrees aftward. Each camera contains four CCD line arrays filtered to blue, green, red, and near-infrared wavelengths, and spatial sampling ranging from 275 m to 1.1 km is obtained over a 400-km swath width. Further instrument checkout shows all systems to be performing well. An on-board calibration system consisting of deployable Spectralon panels and a monitoring system of stable photodiodes is used to maintain high radiometric accuracy. For the study of atmospheric aerosols, the multiple view angle images provide enhanced path lengths and sensitivity to particle size, composition, and shape as a result of sampling in scattering angle. Retrieval methods utilizing these unique data over both land and ocean have been developed. Cloud observations make use of stereoscopic techniques to localize the cloud tops in three dimensions. Radiative-transfer based models are used to identify scene physical characteristics from the multi-angle data, facilitating the calculation of top-of-atm sphere albedo. These observations provide a new and unique resource for studying the shortwave effects of aerosols and clouds on climate.